OPEN ISSUES

- Mechanism for Decoder Synchronization
- Prioritization Details
- Details of Support for Error Recovery
- Support of Specific Services (e.g. Closed Captioning)

Transmission

June 30, 1993

Baseline System

The Grand Alliance system will use one of the following:

- **4 VSB**
- **6 VSB (trellis-coded version of 4 VSB)**
- **32 QAM**
- **32 SS-QAM**

Open Issues and Resolution

A Grand Alliance specialist group on transmission has been formed to:

1. Conduct a paper analysis using technical attributes/parameters and weighting factors

> **Use updated/improved PS/WP-3 computer programs to calculate ATV coverage area and NTSC service area impact**

2. Carry out simultaneous hardware testing in case a decision cannot be made based on the paper analysis

Schedule

- **Paper analysis completed ASAP (depends on availability of PS/WP-3 model)**
- **Begin hardware testing by 10/31/93 if required**
- **Selection by 11/30/93**

VSB Attributes

- Robust
  - Pilot
  - Training Sequence
  - NTSC Interference Rejection Filter
- Bi-level Data (2/4 Level)
  - Extended Audio Threshold
- Excellent Phase Noise Immunity
- Trellis-Coded 6 VSB Version
    - Improved Threshold Performance (over 4VSB)
- Low Cost

QAM Attributes

- **Widely-Used/Proven Classical Modulation for Digital Communications**
- **No Pilot Tone or Training Sequence Required for Carrier Recovery and Equalizer Initialization**
- **Employs Powerful Yet Easily-Implemented Trellis Coding for low C/N Threshold**
- **Simple Receiver Hardware**
- **High Cable Capacity Using 64, 128, 256-QAM**

SS-QAM Attributes

- **Excellent Co-Channel Performance**
- **High Data Rate**
- **Trellis Coding for Improved Threshold Performance**
- **Two-Tier Alternate Mode for Transmission Robustness**

Decision Weighting Factors

- **ATV Coverage Area/ NTSC Service Area Loss - 70 %**
- **Robustness - 15 %**
- **Other System Attributes - 15 %**

High Data Rate Cable Mode

- 64 QAM at 27 Mbps
- 16 VSB or 256 QAM at >37 Mbps

Answers to Questions of General Interest

- We will investigate COFDM
- 16 QAM Can Be Alternate Mode if QAM or SS-QAM is Selected
- Tuners Will Be Included in Any Testing
  - Test Tuner/Demod as a Package
- Increased Audio Robustness
  - 2VSB
  - SS-QAM with Different Carrier Power Levels

Development Plan

June 30, 1993

Answers to Questions of General Interest

- SS-QAM HP/SP power ratio will be reduced to 1.5 dB for analysis/testing
- Multiple Priority Data Can be Supported as Alternate Modes in SS-QAM/VSB
- On-Channel Repeaters for Coverage Extension

Our Goal

Delivery of a Prototype for ACATS verification 9 months after approval of Grand Alliance Proposal by Technical Subgroup

Tasks

- Definition
- Hardware Design
- Construction
- Subsystem testing
- Integration
- Verification
- Documentation

Subsystems

- Video Encoder
- Video Decoder
- Transmission
- Transport
- Audio

Video Encoder/Decoder

- the critical path items
- will support multiple formats
- Joint effort by all members, utilizing collective expertise
- System definition- Sept 30, 1993

Transmission

- comparative testing of SS-QAM, VSB, QAM to be completed by Nov 30, 1993
- Modems exist substantially in hardware today
- Refinements on existing modems will continue
- Advocate of system will provide final version

Transport

- definition to be complete by Aug 31, 1993
- Will be designed to interface to the candidate transmission system

Audio

- **All hardware exists today and will be supplied by the selected advocate (Philips or MIT or Dolby)**
- **comparative testing of Musicam 5.1, MIT-AC, and Dolby AC-3 will be completed by August 31, 1993**

Integration

- Integration will take place at one of various sites, all members of the Alliance are willing to host this activity.
- Site selection will be chosen to expedite schedule
- A Technical Specialist Group has been defined to plan this activity

System Verification

- Will take place at ATTC/ATEL
- Field Verification will follow at Charlotte (as per previous plan)
- Our Planning Assumption:
    - Laboratory Testing comparable to that proposed for re-test
        - Will resolve details with SS-WP2

Documentation

Discussion with ACATS/ATSC needs to take place as soon as possible (after Subgroup's approval) to create a documentation plan

Advanced TV

Advisory Committee on
Advanced Television (ATV) Service

Docket 87-268 TS-009

July 14, 1993

Dear SIR or MADAM:

I am writing on behalf of the Advisory Committee on Advanced Television Service (ACATS), the official body which will recommend to the Federal Communications Commission (FCC) a terrestrial HDTV transmission standard for the United States. This letter is to seek your comments on certain design elements of the newly proposed HDTV transmission system now under final consideration for use in North America.

As you may know, the four all-digital HDTV systems earlier proposed have now joined together in a single, "merged" system dubbed the "Grand Alliance."

The Advisory Committee has designated a Technical Subgroup to evaluate the Alliance proposal and to make recommendations regarding its adoption as a United States standard. As part of that effort, an Experts Group on Production & Receiver/VCR Impact has been formed to evaluate the cost, operational and timing impacts of two design elements of the Alliance's proposal.

First. The Alliance has recommended that the HDTV terrestrial transmission standard contain multiple scanning formats; for example, both a 787.5 progressive scan format and a 1050 interlace scan format. We want your comments on the cost, operational and timing impact on HDTV studio origination equipment and on consumer HDTV equipment of the use of multiple scanning formats as opposed to a single scanning format.

Second. The Alliance has recommended that today's HDTV transmission standard incorporate a migration path to a future, higher line rate, progressively scanned transmission system. We want your comments on the feasibility, cost and timing impacts of designing HDTV studio origination equipment and HDTV consumer equipment now, in order to avoid the obsolescence which may be caused by planned future transmission system improvements.

I have attached a Memorandum discussing these questions in greater detail. Our group invites your questions and/or comments on this letter and the attached Memorandum at your earliest convenience. Please direct any questions—and your response—to Mr. Peter Fannon (Executive Director, ATTC, Suite 200, 1330 Braddock Place, Alexandria, Virginia 22314-1650, USA; telephone 703/739-3850 FAX 703/739-3230). If he cannot answer your questions, he will direct you to someone in our group who can.

We recognize that the questions posed in this letter and the attached Memorandum are complex and that definitive, detailed answers will require time. Nevertheless, we ask you to give us your best preliminary or tentative response by

August 2, and then to provide any further details and background in supplemental responses. Therefore, please try to advise us by then of your *tentative, general* views (subject to confirmation in a later detailed response, if necessary) on the core issues: first, is it more/the same/less expensive, time-consuming to implement, and difficult to manufacture and use professional and consumer equipment needed for a multiple-format transmission system than for a single-format system; and, second, whichever it is, please try to describe the significance of any differences from your perspective, that is whether they are substantial, modest, or insignificant on balance. Additionally, we want your best advice on the cost and time to accommodate now such elements as are possible for a future migration to a higher standard.

We also recognize, of course, that every organization receiving this survey may not be in a position to address all the issues in it; but we would appreciate your help and observations wherever possible. If your company is involved in television production, post-production, and/or distribution, we would especially appreciate your comments on the operational impact of the choice of transmission format (*i.e.* multiple *vs.* single) and the effort to plan now for migration to a future, higher standard.

The FCC Advisory Committee is now in the final stages of its work leading to selection of an HDTV transmission standard for the United States. Because this may be the last opportunity to affect the FCC Advisory Committee's recommendation, and because your input is highly valued, we hope you will be able to respond to this survey and help us evaluate these alternatives.

On behalf of our Experts Group and the FCC Advisory Committee, we thank you very much for your contribution to this important work.

Very truly yours,

George Vradenburg III
Chairman, Experts Group on Production
& Receiver/VCR Impact

Attachment

cc: Robert Rast, General Instrument Corporation (Grand Alliance liaison)
Experts Group Members:
Peter Fannon, ATTC/Advanced Television Test Center
Reggie Gilliam, IBEW/International Brotherhood of Electrical Workers
George Hanover, EIA/Electronic Industries Association
Howard Miller, PBS/Public Broadcasting Service
Laurence Thorpe, Sony Advanced Systems
Werner Wedam, Sharp Electronics Corporation